



## SEQUENCE LISTING

<110> Dalton, John  
Andrews, Stuart

<120> Vaccine Containing a Thiol Protease

<130> 1181-281

<140> 10/ 620,451  
<141> 2003-07-17

<150> US 08/ 424,361  
<151> 1995-05-25

<150> PCT/ GB93/ 02172  
<151> 1993-10-21

<160> 23

<170> PatentIn version 3.2

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Val Lys Asp Gln  
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Leu Pro Asp Ser Val Asp Trp Arg Glu Lys Gly Gly Val Thr Pro Val  
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Lys Asp Gln

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Lys Asp Gln

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<213> Rattus norvegicus

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Lys Asp Gln

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<211> 19

<212> PRT

<213> Homo sapiens

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Lys Asp Gln

<210> 6

<211> 19

<212> PRT

<213> Trypanosoma cruzi

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Lys Asp Gln

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<213> Schistosoma mansoni

<400> 7

Ile Pro Ser Asn Phe Asp Ser Arg Lys Lys Trp Pro Gly Cys Lys Ser  
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Ile Ala Thr Ile Arg Asp Gln  
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<210> 8  
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<400> 8

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<400> 9

Ala Val Pro Asp Lys Ile Asp Pro Arg Glu Ser Gly Tyr Val Thr  
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Ile Pro Arg Ser Val Asp Trp Arg Glu Lys Gly Tyr Val Thr  
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<210> 12

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<213> Homo sapiens

<400> 12

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1 5 10

<210> 13

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<212> PRT

<213> Bovine

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Leu Pro Asp Ser Met Asp Trp Arg Glu Lys Gly Cys Val Thr  
1 5 10

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Ala Pro Ala Ala Val Asp Trp Arg Ala Arg Gly Ala Val Thr  
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<213> Schistosoma mansoni

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<213> Artificial Sequence

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Gln Gly Asn Cys Xaa Xaa Cys Trp Ala Phe Ser Thr Thr Gly Thr Met
1          5           10          15

gag gga caa tat atg aaa aac gaa aaa act agt att tca ttc tct gag      96
Glu Gly Gln Tyr Met Lys Asn Glu Lys Thr Ser Ile Ser Phe Ser Glu
20         25           30

caa caa ctg gtc gat tgt agc ggt cct tgg gga aat aat ggt tgc agt      144
Gln Gln Leu Val Asp Cys Ser Gly Pro Trp Gly Asn Asn Gly Cys Ser
35         40           45

ggt gga ttg atg gaa aat gct tac caa tat ttg aaa caa ttt gga ttg      192
Gly Gly Leu Met Glu Asn Ala Tyr Gln Tyr Leu Lys Gln Phe Gly Leu
50         55           60

gaa acc gaa tcc tct tat ccg tac acg gct gtg gaa ggt cag tgt cga      240
Glu Thr Glu Ser Ser Tyr Pro Tyr Thr Ala Val Glu Gly Gln Cys Arg
65         70           75           80

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|  |     |
|--|-----|
| tac aat agg cag ttg gga gtt gcc aaa gtg acc ggc tac tat act gtg      | 288 |
| Tyr Asn Arg Gln Leu Gly Val Ala Lys Val Thr Gly Tyr Tyr Thr Val      |     |
| 85 90 95   |     |
| cat tct ggc agt gag gta gaa ttg aaa aat cta gtc ggt tcc gaa gga      | 336 |
| His Ser Gly Ser Glu Val Glu Leu Lys Asn Leu Val Gly Ser Glu Gly      |     |
| 100 105 110  |     |
| cct gcc gcg atc gct gtg gat gtg gaa tct gac ttc atg atg tac agg      | 384 |
| Pro Ala Ala Ile Ala Val Asp Val Glu Ser Asp Phe Met Met Tyr Arg      |     |
| 115 120 125  |     |
| agt ggt att tat cag agc caa act tgt tta ccg ttc gct ctg aat cat      | 432 |
| Ser Gly Ile Tyr Gln Ser Gln Thr Cys Leu Pro Phe Ala Leu Asn His      |     |
| 130 135 140  |     |
| gca gtc ttg tct gtc ggt tat gga aca cag gat ggt act gnt t            | 475 |
| Ala Val Leu Ser Val Gly Tyr Gly Thr Gln Asp Gly Thr Xaa              |     |
| 145 150 155  |     |
| <210> 18   |     |
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| <212> PRT  |     |
| <213> <i>Fasciola hepatica</i>                                       |     |
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| <223> The 'Xaa' at location 5 stands for Arg, Ser, Gly, Trp, or Cys. |     |
| <220>  |     |
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| <222> (6)..(6)   |     |
| <223> The 'Xaa' at location 6 stands for Thr, Ala, Pro, or Ser.      |     |
| <220>  |     |
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| <222> (158)..(158)   |     |
| <223> The 'Xaa' at location 158 stands for Asp, Gly, Ala, or Val.    |     |
| <400> 18   |     |
| Gln Gly Asn Cys Xaa Xaa Cys Trp Ala Phe Ser Thr Thr Gly Thr Met      |     |
| 1 5 10 15  |     |
| Glu Gly Gln Tyr Met Lys Asn Glu Lys Thr Ser Ile Ser Phe Ser Glu      |     |
| 20 25 30   |     |
| Gln Gln Leu Val Asp Cys Ser Gly Pro Trp Gly Asn Asn Gly Cys Ser      |     |
| 35 40 45   |     |

Gly Gly Leu Met Glu Asn Ala Tyr Gln Tyr Leu Lys Gln Phe Gly Leu  
50 55 60

Glu Thr Glu Ser Ser Tyr Pro Tyr Thr Ala Val Glu Gly Gln Cys Arg  
65 70 75 80

Tyr Asn Arg Gln Leu Gly Val Ala Lys Val Thr Gly Tyr Tyr Thr Val  
85 90 95

His Ser Gly Ser Glu Val Glu Leu Lys Asn Leu Val Gly Ser Glu Gly  
100 105 110

Pro Ala Ala Ile Ala Val Asp Val Glu Ser Asp Phe Met Met Tyr Arg  
115 120 125

Ser Gly Ile Tyr Gln Ser Gln Thr Cys Leu Pro Phe Ala Leu Asn His  
130 135 140

Ala Val Leu Ser Val Gly Tyr Gly Thr Gln Asp Gly Thr Xaa  
145 150 155

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cat caa gaa gcc cnn ggc tct tgt tgg gnt ttc tca aca aca ggt gct 48  
His Gln Glu Ala Xaa Gly Ser Cys Trp Xaa Phe Ser Thr Thr Gly Ala  
1 5 10 15

atg gaa gga cag tat atg aaa aac caa aga act agt att tca tnc tct 96  
Met Glu Gly Gln Tyr Met Lys Asn Gln Arg Thr Ser Ile Ser Xaa Ser  
20 25 30

gag caa caa ctg gtc gat tgt agc cgt gat ttt ggc aat tat ggt tgt 144  
Glu Gln Gln Leu Val Asp Cys Ser Arg Asp Phe Gly Asn Tyr Gly Cys

|   |     |     |     |
|---|-----|-----|-----|
| 35  | 40  | 45  |     |
| aat ggt gga cta atg gaa aat gca tac gaa tat ttg aaa cga ttt gga<br>Asn Gly Gly Leu Met Glu Asn Ala Tyr Glu Tyr Leu Lys Arg Phe Gly<br>50  | 55  | 60  | 192 |
| ttg gaa acc gag tct tct tat cct tac agg gct gtg gaa gga caa tgt<br>Leu Glu Thr Glu Ser Ser Tyr Pro Tyr Arg Ala Val Glu Gly Gln Cys<br>65  | 70  | 75  | 240 |
| cga tac aac gag cag ttg gga gtt gcc aaa gtg act agc tac tat acg<br>Arg Tyr Asn Glu Gln Leu Gly Val Ala Lys Val Thr Ser Tyr Tyr Thr<br>85  | 90  | 95  | 288 |
| gta cat tct gga gat gag gta gaa ttg caa aat cta gtc ggt gcc gaa<br>Val His Ser Gly Asp Glu Val Glu Leu Gln Asn Leu Val Gly Ala Glu<br>100 | 105 | 110 | 336 |
| gga cct gct gcg gtc gct ttg gat gtg gag tca gac ttc atg atg tac<br>Gly Pro Ala Ala Val Ala Leu Asp Val Glu Ser Asp Phe Met Met Tyr<br>115 | 120 | 125 | 384 |
| agg agt ggt att tat cag agc caa act tgt tca ccg gat cgt ttg aac<br>Arg Ser Gly Ile Tyr Gln Ser Gln Thr Cys Ser Pro Asp Arg Leu Asn<br>130 | 135 | 140 | 432 |
| cat gga gtg ttg nct gtc gnt tat gga acn cag ggt ggt nct cnc<br>His Gly Val Leu Xaa Val Xaa Tyr Gly Thr Gln Gly Gly Xaa Xaa<br>145         | 150 | 155 | 477 |
| <br>  |     |     |     |
| <210> 20  |     |     |     |
| <211> 159   |     |     |     |
| <212> PRT   |     |     |     |
| <213> Fasciola hepatica   |     |     |     |
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| <220>   |     |     |     |
| <221> misc_feature  |     |     |     |
| <222> (5)..(5)  |     |     |     |
| <223> The 'Xaa' at location 5 stands for Gln, His, Arg, Pro, or Leu.  |     |     |     |
| <br>  |     |     |     |
| <220>   |     |     |     |
| <221> misc_feature  |     |     |     |
| <222> (10)..(10)  |     |     |     |
| <223> The 'Xaa' at location 10 stands for Asp, Gly, Ala, or Val.  |     |     |     |
| <br>  |     |     |     |
| <220>   |     |     |     |
| <221> misc_feature  |     |     |     |
| <222> (31)..(31)  |     |     |     |
| <223> The 'Xaa' at location 31 stands for Tyr, Cys, Ser, or Phe.  |     |     |     |
| <br>  |     |     |     |
| <220>   |     |     |     |
| <221> misc_feature  |     |     |     |
| <222> (149)..(149)  |     |     |     |
| <223> The 'Xaa' at location 149 stands for Thr, Ala, Pro, or Ser.   |     |     |     |

<220>  
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<222> (151)..(151)  
<223> The 'Xaa' at location 151 stands for Asp, Gly, Ala, or Val.

<220>  
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<220>  
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<222> (159)..(159)  
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His Gln Glu Ala Xaa Gly Ser Cys Trp Xaa Phe Ser Thr Thr Gly Ala  
1 5 10 15

Met Glu Gly Gln Tyr Met Lys Asn Gln Arg Thr Ser Ile Ser Xaa Ser  
20 25 30

Glu Gln Gln Leu Val Asp Cys Ser Arg Asp Phe Gly Asn Tyr Gly Cys  
35 40 45

Asn Gly Gly Leu Met Glu Asn Ala Tyr Glu Tyr Leu Lys Arg Phe Gly  
50 55 60

Leu Glu Thr Glu Ser Ser Tyr Pro Tyr Arg Ala Val Glu Gly Gln Cys  
65 70 75 80

Arg Tyr Asn Glu Gln Leu Gly Val Ala Lys Val Thr Ser Tyr Tyr Thr  
85 90 95

Val His Ser Gly Asp Glu Val Glu Leu Gln Asn Leu Val Gly Ala Glu  
100 105 110

Gly Pro Ala Ala Val Ala Leu Asp Val Glu Ser Asp Phe Met Met Tyr  
115 120 125

Arg Ser Gly Ile Tyr Gln Ser Gln Thr Cys Ser Pro Asp Arg Leu Asn  
130 135 140

His Gly Val Leu Xaa Val Xaa Tyr Gly Thr Gln Gly Gly Xaa Xaa

| <210> | 21                 | 145 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-------|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <211> | 472                | 150 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| <212> | DNA                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| <213> | Fasciola hepatica  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
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| <223> | n = any nucleotide |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| <220> |                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
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| <400> | 21                 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| gct   | aaa                | tgt | ggc | tcc | tgt | tgg | gca | ttc | tca | aca | acc | ggc | act | atg | gag |     | 48  |
| Ala   | Lys                | Cys | Gly | Ser | Cys | Trp | Ala | Phe | Ser | Thr | Thr | Gly | Thr | Met | Glu |     |     |
| 1     |                    | 5   |     |     |     | 10  |     |     |     |     |     |     | 15  |     |     |     |     |
| gga   | caa                | tat | atg | aaa | aac | gaa | aaa | act | agt | ntt | tca | ncc | tct | gag | caa |     | 96  |
| Gly   | Gln                | Tyr | Met | Lys | Asn | Glu | Lys | Thr | Ser | Xaa | Ser | Xaa | Ser | Glu | Gln |     |     |
| 20    |                    |     | 25  |     |     |     |     |     |     |     |     |     | 30  |     |     |     |     |
| caa   | ctg                | gtc | gat | tgt | agc | ggc | cct | tgg | gga | aat | aat | ggc | tgc | agt | ggc |     | 144 |
| Gln   | Leu                | Val | Asp | Cys | Ser | Gly | Pro | Trp | Gly | Asn | Asn | Gly | Cys | Ser | Gly |     |     |
| 35    |                    |     | 40  |     |     |     |     |     |     |     |     |     | 45  |     |     |     |     |
| gga   | ttg                | atg | gaa | aat | gct | tac | caa | tat | tta | aaa | caa | ttt | gga | ttg | gaa |     | 192 |
| Gly   | Leu                | Met | Glu | Asn | Ala | Tyr | Gln | Tyr | Leu | Lys | Gln | Phe | Gly | Leu | Glu |     |     |
| 50    |                    |     | 55  |     |     |     |     |     |     |     |     |     | 60  |     |     |     |     |
| acc   | gaa                | tcc | tct | tat | ccg | tac | acg | gct | gtg | gaa | ggc | tgt | cga | tac |     | 240 |     |
| Thr   | Glu                | Ser | Ser | Tyr | Pro | Tyr | Thr | Ala | Val | Glu | Gly | Gln | Cys | Arg | Tyr |     |     |
| 65    |                    |     | 70  |     |     |     |     |     |     |     |     |     | 80  |     |     |     |     |
| aat   | agg                | cag | ttg | gga | gtt | gcc | aaa | gtg | act | ggc | tac | tat | act | gtg | cat |     | 288 |
| Asn   | Arg                | Gln | Leu | Gly | Val | Ala | Lys | Val | Thr | Gly | Tyr | Tyr | Thr | Val | His |     |     |
| 85    |                    |     |     |     |     |     |     |     |     |     |     |     |     | 95  |     |     |     |
| tct   | ggc                | agt | gag | gca | gga | ttg | aaa | aat | cta | gtc | ggc | tcc | gaa | gga | cct |     | 336 |
| Ser   | Gly                | Ser | Glu | Ala | Gly | Leu | Lys | Asn | Leu | Val | Gly | Ser | Glu | Gly | Pro |     |     |
| 100   |                    |     | 105 |     |     |     |     |     |     |     |     |     | 110 |     |     |     |     |
| gcc   | gct                | atc | gtg | gat | gtg | gaa | tct | gac | ttc | atg | atg | tac | agg | agt |     | 384 |     |
| Ala   | Ala                | Ile | Ala | Val | Asp | Val | Glu | Ser | Asp | Phe | Met | Met | Tyr | Arg | Ser |     |     |
| 115   |                    |     |     |     |     |     |     |     |     |     |     |     | 125 |     |     |     |     |
| ggt   | att                | tat | cag | anc | caa | act | tgt | tta | ccg | ttc | gct | ttg | aat | cat | gca |     | 432 |
| Gly   | Ile                | Tyr | Gln | Xaa | Gln | Thr | Cys | Leu | Pro | Phe | Ala | Leu | Asn | His | Ala |     |     |
| 130   |                    |     |     |     |     |     |     |     |     |     |     |     | 140 |     |     |     |     |

gtc ttg nct gtc gat tat gga aca cag gat ggt nac ncc c 472  
Val Leu Xaa Val Asp Tyr Gly Thr Gln Asp Gly Xaa Xaa  
145 150 155

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<220>  
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<223> The 'Xaa' at location 133 stands for Asn, Ser, Thr, or Ile.

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<223> The 'Xaa' at location 147 stands for Thr, Ala, Pro, or Ser.

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<223> The 'Xaa' at location 156 stands for Asn, Asp, His, or Tyr.

<220>  
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<400> 22

Ala Lys Cys Gly Ser Cys Trp Ala Phe Ser Thr Thr Gly Thr Met Glu  
1 5 10 15

Gly Gln Tyr Met Lys Asn Glu Lys Thr Ser Xaa Ser Xaa Ser Glu Gln  
20 25 30

Gln Leu Val Asp Cys Ser Gly Pro Trp Gly Asn Asn Gly Cys Ser Gly  
35 40 45

Gly Leu Met Glu Asn Ala Tyr Gln Tyr Leu Lys Gln Phe Gly Leu Glu

50

55

60

Thr Glu Ser Ser Tyr Pro Tyr Thr Ala Val Glu Gly Gln Cys Arg Tyr  
65 70 75 80

Asn Arg Gln Leu Gly Val Ala Lys Val Thr Gly Tyr Tyr Thr Val His  
85 90 95

Ser Gly Ser Glu Ala Gly Leu Lys Asn Leu Val Gly Ser Glu Gly Pro  
100 105 110

Ala Ala Ile Ala Val Asp Val Glu Ser Asp Phe Met Met Tyr Arg Ser  
115 120 125

Gly Ile Tyr Gln Xaa Gln Thr Cys Leu Pro Phe Ala Leu Asn His Ala  
130 135 140

Val Leu Xaa Val Asp Tyr Gly Thr Gln Asp Gly Xaa Xaa  
145 150 155

<210> 23

<211> 12

<212> PRT

<213> *Fasciola hepatica*

<400> 23

Ala Val Pro Asp Lys Ile Asp Arg Arg Glu Ser Gly  
1 5 10